



Overview: Arizona College and Career Ready Standards (AZCC Standards) in mathematics and English language arts and literacy were adopted by the Arizona State Board of Education in 2010. Since then, school districts and charter schools across Arizona have begun transitioning curriculum and instruction to promote the mastery of these standards by Arizona students. Assessment Technology, Incorporated (ATI) provides the Galileo® K-12 Online Instructional Improvement and Instructional Effectiveness System to 244 school districts and charter schools serving more than 500,000 students throughout the state of Arizona. As part of these services, ATI conducts ongoing research to provide districts and charter schools with information about student standards mastery that can guide instruction and intervention. The transition to the implementation of a new set of standards is by its very nature a fluid process that requires continuous evaluation and optimization to ensure that the desired goals are achieved. The goal of the current brief is to provide policy makers, school districts, charter schools, parents, families, and other stakeholders with information about the progress of Arizona students of various abilities towards mastery of the AZCC standards.

Benefits of Item Response Theory Approach: ATI conducts ongoing research using procedures based in Item Response Theory (IRT) to develop and maintain item banks that can be used by local districts/charters to design assessments that are aligned to state standards as well as to the district/charter curriculum and pacing guide. ATI conducts analyses on a regular basis that use all student responses to each item to estimate IRT item parameters describing item characteristics such as difficulty. The application of IRT procedures affords a number of benefits for the current research. First, standards mastery can be evaluated based on the entire ATI item bank rather than a small set of items from one specific assessment. Second, standards mastery can be evaluated for the entire population of Arizona students served by ATI rather than just the students who took a specific assessment. This is possible because the percentage of students likely to respond correctly to an item is directly linked to the item parameters and the position of those students within the ability distribution.

Design and Analysis: This research focused on the current item parameter estimates for items within the ATI item banks aligned to the AZCC standards in mathematics and English language arts and literacy in third and eighth grade. On average, current item parameter estimates were available for approximately 12 items per standard in third grade mathematics, 21 items per standard in third grade English language arts and literacy, 12 items per standard in eighth grade mathematics, and 26 in eighth grade English language arts and literacy. These item parameter estimates were based on the most recent IRT analyses including item responses from more than 75,000 Arizona students served by ATI districts/charters. The most current item parameter estimates for the items aligned to each standard were summarized to establish the average item parameters for each standard. The average item parameters for each standard were then used to estimate the percentage of Arizona students attaining various percentile ranks within the Arizona ability distribution who are likely to show mastery of that standard. Cut points were also selected that categorize the standards based on the percentage of students with a given percentile rank who are likely to show mastery (i.e., 0-49%, 50-74%, 75-100%). These cut points were set to facilitate the identification of areas on which instruction should be focused. However, it is important to note that the cut points could be set to designate different ranges of standards mastery for the purposes of guiding other types of decisions (e.g., determining whether a student will pass the statewide assessment).

Results: Tables 1-4 illustrate the full set of results including the percentage of students likely to show standards mastery for each standard within each grade and content area for students at the 5th, 15th,



50th, 85th, and 95th percentiles within the Arizona ability distribution. For example, as illustrated in Table 2, 81 percent of students whose ability places them at the 85th percentile of the Arizona ability distribution in third grade English language arts and literacy are likely to show mastery of standard AZ-L-3.1i, meaning that these students can produce simple, compound, and complex sentences. For ease of the reader, the results for each standard in Tables 1-4 have been color coded based on the selected cut points to indicate the percentage of students likely to show mastery (i.e., Orange = 0-49%, Blue = 50-74%, Green = 75-100%).

Conclusion: The results suggest several important conclusions related to the progress toward mastery of the AZCC standards by Arizona students of various abilities. First, student mastery of the AZCC standards is related to the percentile rank of the student within the Arizona ability distribution. Higher ability Arizona students at the 85th percentile or higher are successfully mastering the vast majority of the AZCC standards. In contrast, lower ability Arizona students at the 15th percentile or lower are struggling with the vast majority of the AZCC standards, suggesting a need for additional efforts to promote standards mastery in these students. Second, as the results for average ability Arizona students at the 50th percentile illustrate, mastery varies for different standards. The typical student has mastered some standards, but not others. In this way, the type of information provided in this research has direct implications for instructional practice by identifying specific standards as targets for instruction. When updated information about student ability is continuously available to local school districts and charter schools throughout the year, instruction can be regularly adapted to address the student's current levels of mastery.